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(54) **NON-PARAMETRIC ADAPTIVE POWER LAW DETECTOR**

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(57) **ABSTRACT**

A system for detecting unknown broadband signals in noise consisting of non-stationary narrowband components and a stationary colored broadband component includes a sensor which collects data in which a signal of interest may be found and generates a received data stream. A preprocessor operates on the received data stream to generate training and detection vectors corresponding to noise only and noise plus signal intervals of the received data stream, respectively. A spectrum processor receives the training and detection vectors and generates cleaned broadband spectrum estimates $\tilde{C}_1(f)$ and $\tilde{C}_2(f)$ from the training and detection vectors, respectively, by adaptively separating non-stationary tonal components from the stationary broadband component using modified multiple taper spectral estimation combined with maximum likelihood tonal removal. The cleaned broadband spectrum estimates $\tilde{C}_1(f)$ and $\tilde{C}_2(f)$ are passed to a detection processor which detects unknown broadband signals within the received data stream using a power law detection process which operates on normalized (whitened) broadband signals $\tilde{C}_2(f)/\tilde{C}_1(f)$ to identify the number and location of the DFT bins occupied by a detected signal, if present.

14 Claims, 2 Drawing Sheets